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SOME STORAGE DISORDERS OR PHYSIOLOGICAL DISEASES OF APPLES

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Susceptible Varieties	Conditions Favoring Disorder	Characteristics and Cause	Control
BITTER PIT			
No variety immune, Baldwin, Gravenstein Arkansas, Red Delicious, Newtown, R.I. Greening Northern Spy Stayman Winesap	1. Light crop. 2. Young trees. 3. Stimulation of late season growth 4. Excessively vigorous trees. 5. Large fruit. 6. Fruit from shaded parts of tree. 7. Growing conditions which result in irregularities of nutritional and moisture availability. 8. Early picked fruit high in starch content. 9. Possible relationship between K & Mg: Ca in leaves and fruit. The higher the K & Mg content in relation to Ca, the greater the susceptibility.	1. Possibly caused by uneven starch conversion in stored apples which brings about an unbalanced osmotic relation between cells. Cells losing starch late, build up high osmotic concentration in their sap and die, leaving areas of dead cells. 2. Affected spots usually associated with veins or water conducting elements. 3. Pits frequently limited to blossom end of fruit. 4. Pits may be deep in the fruit. 5. Fruit are pre-disposed to pit in the orchard.	1. Prevent over stimulation of tree and fruit growth. 2. Prevent irregularities in nutrient supply. 3. Possibly sprays of .75% $Ca(NO_3)_2$ applied 15-30 days before harvest will help. (Research needed to confirm response in Ohio). 4. Prompt storage of properly matured fruit. 5. Maintain high relative humidity in the storage.

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WATER CORE			
Yellow Newtown, Northern Spy, Red Delicious, R.I. Greening, Tompkins King, Jonathan, Stayman Winesap, N.W. Greening, Grimes Golden, Arkansas	1. Becomes more intense as fruit ripens on the tree. 2. More prevalent in highly colored fruit and those most exposed to light. 3. Usually troublesome in regions or during seasons of intense sunlight and high temperatures. 4. Varies with orchard practices, especially those which affect shading and ratio of fruit to foliage, such as fertilizing, pruning, thinning, time of picking, etc.	1. Probably caused by high soluble sugar content from non-uniform conversion of starch resulting in high osmotic concentration and high osmotic pressure. This causes high turgor pressure and water core development. 2. Flesh has water soaked or glassy appearance. 3. Not always detectable by exterior examination 4. Pre-disposes apple to internal breakdown, especially noticeable in early varieties.	1. Harvest at proper maturity. 2. Small amount may disappear in in proper storage. 3. Small apples less affected, recover better in storage. 4. Affected fruit should not be stored for long period - sell early.
JONATHAN SPOT			
Jonathan, Rome Beauty, Spitzenberg, Wealthy, King David, Esopus	1. Highly colored fruit left on the tree until over-ripe. 2. Most serious on apples held at too high a storage temperature. 3. Usually found on most highly colored area of fruit. 4. Delayed cooling after harvest promotes development.	1. Cause unknown but associated with lower acidity in cells immediately below the epidermis of the fruit. 2. Appears as superficial, small black or brown spots just below epidermis. 3. Spots may become sunken in storage. 4. Indicates fruit is ripe or well advanced, may not last much longer in storage. 5. Fruit high in acid, as that stored immediately is less subject to spot.	1. Harvest at proper stage of maturity-not over-mature. 2. Cool promptly to remove field heat and store at proper temperature. 3. Store in controlled-atmosphere (CA) storage. 4. Market fruit at earliest indication of development.

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APPLE SCALD			
Few varieties immune, Arkansas, Stayman Winesap, Grimes, Ben Davis, McIntosh, York, Rome Beauty, R.I. Greening, N.W. Greening, Wagener, Baldwin, Cortland, Red Delicious.	1. Immature apples more susceptible. 2. May show up in storage 60 to 150 days after harvest. 3. Develops most rapidly after removal from storage and exposure to higher temperatures. 4. Management practices resulting in poor fruit color causes more susceptible fruit. 5. Warm nights before harvest period may increase susceptibility. 6. Late rains or irrigation may enhance scald. 7. Large fruit more susceptible.	1. Associated with oxidative mechanism within skin of fruit. 2. Skin in affected areas turns dark brown or gray; mild cases the skin is merely tinted. 3. In severe cases skin may separate from flesh and later may become dead and brown to a depth of 1/2 inch or more. 4. Uncolored areas of fruit affected mostly; yellow or red areas highly resistant. 5. Red sports of varieties may scald as they color before they are physiologically mature. 6. Environment previous to picking determines susceptibility to scald.	1. Treat susceptible fruit with recommended rates of Stop-Scald or DPA. 2. Store only well colored fruit harvested at proper maturity. 3. Store at 30-32°F as soon as possible after harvest. 4. Maintain 85 to 90% R.H. in storage. 5. Market unprotected apples within 60 to 90 days. 6. Periodically remove a sample of fruit from storage and place at room temperature to evaluate for scald development. 7. Use orchard practices that will promote fruit color.

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SOFT SCALD AND SOGGY BREAKDOWN			
Jonathan, Rome Beauty, Grimes Golden, Golden Delicious, Winter Banana, N.W. Greening	1. Low storage temperatures. 2. Delayed cooling after harvest.	1. Causes unknown. 2. Soft scald has appearance of blister-like sunken areas of irregular pattern on the skin with definite margins. 3. Soggy breakdown appears as brown-spongy, watery tissue within the fruit surrounded by healthy tissues; irregular pattern but definite margins between healthy and diseased tissues. It cannot be detected externally.	1. Store susceptible varieties, especially Jonathan at 37-38°F. 2. Prompt cooling after harvest.
INTERNAL OR MEALY BREAKDOWN			
Twenty Ounce, Stayman Winesap, Yellow Newtown, Red Delicious, and many others.	1. Harvesting over-mature fruit. 2. Excessively large fruit is more susceptible. 3. Delayed cooling after harvest may promote disorder. 4. Holding too long in storage favors disorder.	1. Caused by premature tissue senescence. 2. Brownish discoloration of the flesh which becomes soft, dry and mealy. 3. Usually, no outward symptoms in early stages. Later, skin may become brown and fruit may burst.	1. Harvest at proper maturity. 2. Store promptly at low temperatures. 3. Dispose of fruit before the normal storage life of the variety has been reached - check condition frequently in storage.